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ABSTRACT

Researchers have seldom examined whether risk and protective factors are consistently linked to substance use across historical time. Using nationally representative data collected from 22 consecutive cohorts of high school seniors (approximate N=188,000) from the Monitoring the Future project, this study investigated whether correlates of substance use, and variance explained by domains of correlates, changed across historical time. The study found a high degree of consistency across historical time in predictors of past month cigarette use, past month alcohol use, past year marijuana use, and past year cocaine use. Some predictors such as religiosity, political beliefs, truancy, and frequent evenings out were consistently linked to substance use. The consistency of other predictors such as region, parental education, and college plans was contingent in part upon historical time period, the particular substance, and its level of use. The study also found that correlates within the Academics domain explained the most variance in substance use over the past two decades. (Contains 4 tables and 34 references.) (Author/JDM)

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CONSISTENCY AND CHANGE IN CORRELATES OF YOUTH SUBSTANCE USE, 1976-1997

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CONSISTENCY AND CHANGE IN CORRELATES OF YOUTH SUBSTANCE USE, 1976-1997

Monitoring the Future Occasional Paper 49

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ABSTRACT

Researchers have seldom examined whether risk and protective factors are consistently linked to substance use across historical time. Using nationally representative data collected from twenty-two consecutive cohorts of high school seniors (approximate N = 188,000) from the Monitoring the Future (MTF) project, we investigated whether correlates of substance use, and variance explained by domains of correlates, changed across historical time. We found a high degree of consistency across historical time in predictors of past month cigarette use, past month alcohol use, past year marijuana use, and past year cocaine use. Some predictors such as religiosity, political beliefs, truancy, and frequent evenings out were consistently linked to substance use. The consistency of other predictors such as region, parental education, and college plans was contingent in part upon historical time period, the particular substance, and its level of use. We also found that correlates within the Academics domain explained the most variance in substance use over the past two decades.

INTRODUCTION

Substance use among youth continues to be an important public health concern. As such, social scientists are obligated to develop and refine theories, and to conduct empirical studies to help explain substance use etiology and correlates, which in turn should inform successful prevention efforts. Researchers have made tremendous progress in their endeavors, especially in the area of substance use correlates; nonetheless, much remains unexplained regarding risk and protective factors. In particular, few studies have systematically examined consistency in risk and protective factors for youth substance use across historical time.

In this study, we build upon and extend the sparse empirical literature on historical consistency in correlates of substance use, using nationally representative data gathered from twenty-two consecutive cohorts of high school seniors. First, we describe the nature of risk and protective factors for substance use and how historical time period can influence consistency in substance use correlates. Second, we review empirical evidence regarding the stability of substance use correlates across historical time period. Finally, we empirically examine whether risk and protective factors are consistently linked to substance use, and whether domains of correlates explain a consistent proportion of variance in substance use across historical time.

The Nature of Risk and Protective Factors

Researchers have identified numerous correlates of illicit and licit substance use among youth (Bachman, O'Malley, & Johnston, 1980, 1986; Hawkins, Catalano, & Miller, 1992; Jessor & Jessor, 1977; Johnston, O'Malley, & Bachman, 1998; McCoy, Metsch, & Inciardi, 1996; Petraitis, Flay, & Miller, 1995; Wallace & Bachman, 1991). When classifying correlates of substance use, one can distinguish between factors that at high levels are positively associated with substance use (i.e., risk, predisposing, instigations) and factors that at high levels are negatively associated with substance use (i.e., protective, deterrent, controls).

Jessor, Van Den Bos, Vanderryn, Costa, and Turbin (1995, p. 923) define risk factors as those "conditions or variables that are associated with a higher likelihood of negative or undesirable outcomes—mortality or morbidity, in classical usage, or more recently, behaviors that can compromise health, well-being, or social performance." Risk factors are theoretically linked to high levels of substance use because they represent (a) the tendency to engage in problem behavior, (b) low social bonding, (c) detachment from traditional values, (d) disdain for conventional institutions, and (e) involvement with deviant peers (Brook & Brook, 1996; Hawkins et al., 1992; Jessor & Jessor, 1977; Jessor et al., 1995; Johnston, 1973).

Protective factors are conditions or statuses that are controls against health-damaging behaviors and undesirable outcomes. Protective factors decrease the likelihood of engaging in non-normative behavior (Brook & Brook, 1996; Hawkins et al., 1992;

Jessor & Jessor, 1977; Jessor et al., 1995). Protective factors are theoretically linked to low levels of substance use because they represent (a) the tendency to avoid problem behavior, (b) low risk-taking behavior, (c) high social bonding, (d) respect for conventionality, and (e) involvement with conventional peers. The next section addresses how historical time can influence the relationships between risk and protective factors, and substance use.

Historical Time Period and Consistency in Substance Use Correlates

Levels of illicit and licit substance use among youth vary across historical time period (Bachman, Johnston, & O'Malley, 1981; Bachman, O'Malley, & Johnston, 1986; Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Elliott, Huizinga, & Ageton, 1985; Johnston, O'Malley, & Bachman, 1998; Johnston 1991; Menard & Huizinga, 1989; O'Malley, Bachman, & Johnston, 1988). As to why there have been such fluctuations, there is no simple answer for any one substance, nor for substance use in general. This is so because historical time period represents the confluence of countless phenomena that can be related to each other and to substance use. For example, Johnston (1991) proposed that to understand why levels of substance use vary across historical time, one must simultaneously evaluate synergistic changes in social context, modeling, life course of a substance (e.g., onset, maintenance, decline), the emergence of substance use proponents and new substances, the predominant zeitgeist, and the intersection of public and scientific forces.

Over the past three decades, our nation has traversed through periods of post-materialism, hedonism, rebellion against authority, and increased nationalism; has experienced economic recessions, unmatched technological advancement, and a healthy lifestyle movement; and has witnessed the emergence of hip-hop culture, AIDS, and the Internet. In addition, new substances have emerged, there have been a number of unfortunate public exemplars (e.g., Len Bias, Chris Farley, John Belushi), and institutional forces have joined together to wage a national "war on drugs." These factors have profoundly shaped the character of our nation and likely altered secular trends in substance use among both young people and adults.

Historical time period may also impact substance use in a less obvious way. It is possible that relationships between correlates and substance use vary by historical time period. This possibility has important implications for studying substance use etiology and prevention among youth. For example, having plans to attend college may be positively associated with marijuana use during certain historical time periods but negatively or not associated during other periods. That is, the relationship between college plans and marijuana use may be inconsistent across historical time. Inconsistency is important because theory and social policy based upon, and interventions linked to, the relationship between an established correlate such as college plans and substance use may become unreliable and of limited use over time.

Previous Empirical Evidence

There are few studies that have addressed if and how correlates of illicit and licit substance use, as well as the proportion of variance explained by domains of correlates, shift over historical time. Bachman et al. (1980) examined whether variation in substance use among nationally representative cohorts of high school seniors from 1975 to 1979 was linked to changes in risk and protective factors. They also examined whether correlates divided into four domains—Social Location, Educational Experiences and Behaviors, Occupational Experiences and Behaviors, and Lifestyle Orientation—maintained explanatory power.

In the Social Location domain, the authors included gender, race, parental education, household structure, urbanicity, and region. The Educational Experiences and Behaviors domain included college preparatory classes, college plans, high school grades, and truancy. In Occupational Experiences and Behaviors, the authors included hours worked and total income per week. Finally, the Lifestyle Orientations domain included religious commitment, conservatism, evenings out, and dates per week. Comparing bivariate and partial correlations, and summary statistics from blocked multiple regression models across the five-year period, they found considerable consistency in correlates of cigarette use, alcohol use, marijuana use, and illicit substance use. Bachman and colleagues (1980) concluded that youth substance users remained much the same—thus the matrix of risk and protection remained stable—whereas the types and amounts of substances used shifted over time.

Attempting to understand peaks in marijuana and cocaine use during the early 1980s, Bachman et al. (1986) re-examined change and consistency in correlates of substance use across a longer time frame. In this study, the authors investigated correlates of substance use during the historical time period of 1975–1986 among nationally representative cohorts of high school seniors. They concluded, again, that risk and protective factors were consistent over time. Correlates in the Social Location, Educational Experiences and Behaviors, Occupational Experiences and Behaviors, and Lifestyle Orientation domains maintained explanatory power over time, and when inconsistency was observed it was gradual and orderly. For example, the magnitude of the correlation between religious commitment and drug use tended to linearly decline over time.

Donovan, Jessor, and Costa (1999) investigated whether Problem Behavior Theory (PBT) (Jessor & Jessor, 1977; Jessor, Donovan, & Costa, 1991) could consistently account for problem drinking among adolescents using six independent samples collected at different time points—1972, 1974, 1978, 1985, 1989, and 1992. The authors examined predictors in the Personality system, the Perceived Environment system, and the Behavior system separately by gender. Each PBT system is theoretically organized around domains of variables representing instigations to engage in problem behavior (i.e., risk factors) and controls against engaging in problem behavior (i.e., protective factors) (Jessor & Jessor, 1977; Jessor et al., 1995). For example, correlates such as value on achievement, value on independence, expectations for academic

achievement, and religiosity constituted the Personality system. Correlates such as parent-friends compatibility, friends' approval of drinking, and friends' model for drinking and drug use constituted the Perceived Environment system. Finally, correlates such as frequency of marijuana use, general deviant behavior (e.g., lying to parents, shoplifting, truancy), and church attendance constituted the Behavior system.

Comparing bivariate and partial correlations, as well as summary statistics from blocked multiple regression models, Donovan and colleagues (1999) found considerable stability in the associations between PBT correlates and alcohol use across time and over datasets. The strongest and most consistent correlates of adolescent drinking were measures taken from the Perceived Environment and Behavior systems. An important limitation of this study is that only two of the six samples were nationally representative.

Overview of Present Study

In this study, we examined the extent to which Social Location, Conventionality, Academics, Employment, and Social Interaction correlates (i.e., risk and protective factors) were consistently associated with substance use outcomes across the past two decades. For example, did gender, a Social Location correlate, consistently relate to substance use across historical time? We also examined the proportion of variance in substance use explained by domains of correlates over time. For example, did a set of Social Location correlates (including gender) explain a consistent proportion of variance in substance use across historical time periods? Examination of the *independent* contribution of risk and protective factors, as well as the *collective* contribution of domains of correlates, strengthens our understanding of consistency in substance use predictors across historical time.

Consistent with previous empirical evidence (Bachman et al., 1980, 1986; Donovan et al., 1999), we expected to find much stability in risk and protective factors for substance use over historical time. We also expected to find much consistency but some fluctuation in the proportion of variance explained by domains of correlates, given that the level of substance use and therefore the amount of variance to explain has varied across the past two decades.

METHODS

Sample

Data were drawn from the Monitoring the Future (MTF) Project, an ongoing study of young people (a detailed description can be found in Bachman, Johnston, & O'Malley, 1996; Johnston, O'Malley, Schulenberg, & Bachman, 1996). Every year since 1975, a multi-stage, clustered sample of high schools was drawn. Approximately 135 high schools were randomly sampled from the coterminous 48 states, and between 15,000 and 19,000 high school seniors were surveyed each year. Students were asked a range of questions regarding their use of cigarettes, alcohol, marijuana, and other substances, as

well as their peer relationships, future career plans, self-efficacy, life goals and priorities, and gender role perceptions.

Respondents completed self-administered, machine-readable questionnaires during a normal class session. The average response rate was 84 percent from 1976 to 1997. School absence was the primary reason for non-response. Analyses were limited to those high school seniors that reported their race as (a) Black or African American, (b) White, or (c) Hispanic (i.e., Mexican American or Chicano, Cuban American, Puerto Rican, or other Latin American). Results shown were based upon analysis of respondents without any missing data[1] (listwise deletion). The data were weighted for differential probabilities of sample selection.

Measures

Brief descriptions of the substance use measures and risk and protective factors are presented below. Verbatim wording and response scales are shown in Appendix A. Univariate statistics for the risk and protective factors are presented in Appendix B; bivariate correlations among these correlates are presented in Appendix C.

Substance use. Frequency of substance use was assessed by four single item indicators: (a) past 30-day cigarette use, (b) past 30-day alcohol use, (c) past 12-month marijuana use, and (d) past 12-month cocaine use.

Risk and protective factors. Consistent with previous studies by Bachman et al. (1980; 1986), the following risk and protective factors for illicit and licit substance use were included in our models: gender, race, parental education, number of parents in household, urbanicity, region, religious commitment, political beliefs, college plans, grade point average, truancy, hours worked per week, total weekly income, number of evenings that seniors went out for recreation, and number of dates in an average week.

Risk and protective factors were classified into five conceptual domains: (a) Social Location, (b) Conventionality, (c) Academics, (d) Employment, and (e) Social Interaction. Correlates in the *Social Location* domain captured respondents' socio-demographic background. Bachman, Johnston, & O'Malley (1981) and others (Bachman, Wallace, O'Malley, Johnston, Kurth, & Neighbors, 1991; Johnston et al., 1998; Brook & Brook, 1996; Johnston, 1991) note the importance of measures like gender, race, and region, as well as family structure in predicting substance use. Correlates in the *Conventionality* domain measured the degree to which youth are bonded to mainstream, traditional values. Donovan et al. (1999), Cochran (1991), and others (Donovan, 1996;

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[1] The maximum possible sample size would have been approximately 330,000 cases. Listwise deletion of missing data, which is the most conservative method for assessing stability and consistency, resulted in a sample of approximately 188,000 cases. More than 100,000 respondents had missing data on political conservatism. Importantly, however, results using pairwise deletion differed only negligibly from results using listwise deletion.

McBride, Mutch, & Chitwood, 1996) suggest that measures like conservatism and religious beliefs are critical correlates of substance use. The *Academics* domain included correlates that gauge how well youth perform in school, how many days of school they missed, and their expectations for future educational success. Schulenberg, Bachman, O'Malley, & Johnston, (1994), Hawkins et al. (1992), and others (Elliot et al., 1985; Jessor et al., 1991; Jessor & Jessor, 1977) theorize and demonstrate a strong negative relationship between educational success and attachment to school, and substance use. Correlates in the *Employment* domain measured the extent to which young people were working and generating income. Bachman and Schulenberg (1993) and others (Greenberger & Steinberg, 1986; Mortimer, Finch, Shanahan, & Ryu, 1992) have shown that number of hours worked is positively correlated with substance use and other problem behaviors. And finally, correlates in the *Social Interaction* domain assessed the degree to which respondents are engaged in social, peer-related activities outside the home. Jessor and Jessor (1977), Donovan et al. (1999), Hawkins et al. (1992), and Bachman, Johnston, & O'Malley (1990) suggest that peer relations and peer attitudes are critical factors to consider when predicting susceptibility to substance use.

Although these basic correlates and domains are not exhaustive in scope, they encompass the predominant types and sets of variables theorized to predict substance use among older adolescents, and they are comparable to correlates and domains examined in previous empirical studies (See Bachman et al., 1980, 1986; Donovan et al., 1999). Within each domain, there are correlates that could be considered either risk or protective factors for substance use. Together these domains cover a wide range of psycho-social aspects of older adolescents' lives.

Historical time period. Seven historical time periods, or cohort groupings, were compared: 1976-78, 1979-81, 1982-84, 1985-87, 1988-90, 1991-93, and 1994-97. We grouped our samples of high school senior cohorts in this way to facilitate analyses, as well as to guard against distorting important fluctuations in substance use. Because our samples were comprised solely of high school seniors, we are essentially holding age constant in an attempt to assess how relationships shift over historical time period. We know, however, that because age is held constant, birth cohort effects are entangled with historical time period effects (See O'Malley et al., 1988).

Analytic Strategies

Ordinary Least Squares (OLS) regression analysis techniques were used to examine how risk and protective factors relate to level of substance use. We were interested in estimating the independent contribution of risk and protective factors to explaining variation in substance use, controlling for other predictors. Also, we were interested in the proportion of variance explained by domains of correlates over time.

In Phase One of the analyses, the strategy was to examine a model in which substance use was simultaneously regressed on all correlates. This model was then replicated by historical time period to address whether the relationships between correlates and substance use were consistent across historical time period. This type of

regression model, replicated by historical time period, implicitly tests for statistical interactions, or moderating effects of historical time period on the relationships between correlates and substance use. In regression analyses not shown, using the concatenated 1976-97 sample, we explicitly tested for interactions between six dummy variables representing the seven historical time periods and correlates from the Social Location, Conventionality, Academics, Employment, and Social Interaction domains. We used these analyses to inform our interpretation of the results shown.

In Phase Two of the analyses, the strategy involved calculating the incremental increase in variance associated with the introduction of domains controlling for previously entered domains. This strategy allowed us to compare consistency in explained variance associated with domains by outcome and historical time period.

RESULTS

Phase One: Predictors of Substance Use Across Historical Time

Tables 1 through 4 display the associations between predictors in the Social Location, Conventionality, Academics, Employment, and Social Interaction domains with each of the substance use outcomes (i.e., past month cigarette smoking, past month drinking, past year marijuana use, past year cocaine use). The first column in each table presents bivariate correlations (which will not be discussed) between each substance use measure and correlates in the concatenated (1976-97) sample. The second column shows unstandardized coefficients from regressions of substance use on all risk and protective factors in the concatenated sample. The third through ninth columns show unstandardized coefficients from regressions of substance use on risk and protective factors replicated by historical time period (i.e., 1976-78, 1979-81, 1982-84, 1985-87, 1988-90, 1991-93, and 1994-97). The bottom rows of Tables 1 through 4 show the sample size, the proportion of explained variance, and univariate statistics describing substance use by historical time period. Consistent with previous empirical studies (Bachman et al., 1980, 1986; Donovan et al., 1999), we found that most factors were consistently related to substance use; therefore, we focus mainly on those associations that showed inconsistency (defined below) over time.

Cigarette use. We examined risk and protective factors for past month cigarette use in Table 1. Again, the following discussion applies to the multivariate results (second through ninth columns), not the bivariate correlations shown in the first column. In the concatenated (1976-97) sample, most predictors were significantly associated with cigarette use (second column). As reported previously (See Johnston et al., 1998), levels of cigarette use among high school seniors were highest in the late 1970s and declined from that period forward, with an increase reported for the 1994-97 cohorts.

Across the seven historical time periods, there was much consistency in correlates of cigarette use. The consistent predictors of cigarette use were the following: gender (women were higher), race (Whites were highest), number of parents in the household

(negatively related), religious commitment (negatively related), political beliefs (positively related), college plans (negatively related), grade point average (negatively related), truancy (positively related), hours worked per week (positively related), total weekly income (positively related), and evenings out per week (positively related).

Inconsistent predictors were defined as having two or more statistically non-significant ($p > .001$)[2] coefficients across the seven historical time periods. By this rule, parental education, urbanicity, region, and number of dates per week were inconsistent predictors of cigarette smoking. Parental education was not associated with cigarette smoking in the concatenated (1976-97) sample but was significantly predictive of cigarette smoking in the 1988-90 and 1994-97 cohort groupings. Urbanicity, which was found to be slightly but significantly negatively related to cigarette smoking in the concatenated sample, was predictive of cigarette smoking in the 1976-78, 1979-81, 1988-90, and 1994-97 cohorts but was not related during other historical time periods. Thus, although the general pattern was that living in a more urban area was associated with lower levels of cigarette use, the relationship was small and inconsistent across historical time. Youth in the West consistently reported lower levels of cigarette use than youth who resided in the South, but other regional differences varied considerably across historical time periods. Finally, dating was significantly and positively related to cigarette smoking in the concatenated sample, as well as in the cohort groupings from 1976 to 1990; however, during recent historical periods (1991-97), dating was not significantly associated with cigarette smoking.

Alcohol use. We examined predictors of past month alcohol use in Table 2. In the concatenated sample, most risk and protective factors were significantly predictive of alcohol use. Alcohol use was higher in 1976-87 than in recent historical time periods (See Johnston et al., 1998).

As shown in Table 2, the following predictors were consistently and significantly related to alcohol use across historical time: gender (males were higher), being Black (Whites were higher), parental education (positively related), urbanicity (negatively related), religious commitment (negatively related), political beliefs (positively related), grade point average (negatively related), truancy (positively related), total weekly income (positively related), evenings out (positively related), and number of dates per week (positively related). *By the rule established previously, however, being Hispanic, number of parents in the household, region, urbanicity, college plans, and hours worked per week were inconsistent predictors of alcohol use.* Although Hispanic high school seniors were less likely than White seniors to report high levels of alcohol use in the concatenated sample, this effect was smaller and non-significant when the sample was disaggregated by historical time period. Number of parents in the household was predictive of low levels of alcohol use but only among 1991-93 high school senior cohorts. Urbanicity was inversely linked with alcohol use in all but two historical time periods (1979-81 and

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[2] The stringent criteria for statistical significance (critical value < .001) is justified by the large sample sizes.

1991-93). Compared to those in the South, respondents living in the West tended to report lower levels of alcohol use, whereas other regional differences were inconsistent.

Across all historical time periods, seniors who tended to have plans for college did not differ significantly in level of alcohol use from those without such plans, controlling for other variables (including grades). The number of hours that high school seniors worked during an average week was significantly predictive of high levels of alcohol use from 1976 to 1984, controlling for other variables. But from 1985 to 1997, number of hours worked per week was not statistically associated with alcohol use.

Marijuana use. Correlates of marijuana use were examined next (See Table 3). In the concatenated regression analysis, most risk and protective factors were significantly predictive of annual marijuana use. As reported elsewhere (See Johnston et al., 1998), marijuana use declined over the past two decades.

Across historical time periods, the consistent predictors of marijuana use were the following: gender (males higher), being Black (Whites were higher), parental education (positively related), number of parents in household (negatively related), urbanicity (positively related), religious commitment (negatively related), political beliefs (positively related), grade point average (negatively related), truancy (positively related), total weekly income (positively related), and evenings out per week (positively related). *However, being Hispanic, region, college plans, hours worked per week, and number of dates per week were inconsistent predictors of marijuana smoking.* In the concatenated sample, Hispanic youth were significantly less likely than White youth to report high levels of marijuana use. In contrast, by historical time period, the difference between Hispanic and White adolescents' level of marijuana use was significant only in two time periods (1988-90 and 1994-97). Seniors who lived in the Northeast tended to report higher levels of marijuana use than those in the South, especially from 1976 to 1987. After this period, regional differences between respondents living in the Northeast compared to the South did not reach statistical significance. The difference in frequency of marijuana use between seniors in the West and North Central, compared to the South, was inconsistent as well.

In the concatenated sample, high school seniors who tended to perceive that they would graduate from college reported low levels of marijuana use. However, by historical time period, we found that this was not the case for high school senior cohort groupings in the earliest and most recent periods, 1976-78 and 1994-97. During these time periods, college plans did not have a protective influence, controlling for other variables. The number of hours that seniors worked during an average week was significantly predictive of high levels of marijuana use from 1976 to 1984. In the period from 1976 to 1987, cohorts of high school seniors who tended to go out frequently on dates reported high levels of marijuana smoking. Frequent dates were not predictive among more recent cohort groupings.

Cocaine use. The regression coefficients in the second column of Table 4 show that, in the concatenated sample, most risk and protective factors were significantly

linked to annual cocaine use. Although levels of cocaine use tended to be low over the past two decades, use peaked during the mid 1980s (See Johnston et al., 1998).

Controlling for historical time period, predictors consistently linked to cocaine use were: being Black (Whites higher), number of parents in household (negatively related), religious commitment (negatively related), political beliefs (positively related), grade point average (negatively related), truancy (positively related), and evenings out (positively related). *In contrast, gender, being Hispanic, parental education, urbanicity, region, college plans, hours worked per week, total weekly income, and number of dates per week were inconsistently linked to cocaine use over time.* Across the seven historical time periods, controlling for other variables, male and female high school seniors did not differ significantly in their level of cocaine use. In addition, White and Hispanic high school seniors did not significantly differ in their levels of annual cocaine use, controlling for other variables. Controlling for other correlates, urbanicity was predictive of high levels of cocaine use among the 1982-87 cohorts. Regional differences in cocaine use varied considerably by historical time period.

Having college plans was statistically linked to low levels of cocaine use in three of seven historical time periods (1985-87, 1988-90, and 1994-97). Across time, working many hours was not statistically associated with cocaine use, even though in the concatenated sample it was a significant predictor. On the other hand, total weekly income was positively and significantly associated with cocaine use from 1979 to 1990 but not during other periods. Finally, from 1976 to 1987, controlling for other variables, cohorts of high school seniors who tended to go out on dates reported high levels of cocaine use.

Summary of Phase One. As shown in Tables 1 through 4, we found considerable consistency in predictors of substance use across historical time. In particular, across historical time periods and substances, consistent correlates were religious commitment, political beliefs, grade point average, truancy, and evenings out. When we did find inconsistency (i.e., two or more non-significant [$p > .001$] coefficients across the seven historical time periods), region was the only correlate that was inconsistently related to all four substance use measures, with the exception of the difference in level of cigarette and alcohol use between high school seniors in the West compared to the South . For instance, controlling for other predictors in the model, gender was inconsistently linked to cocaine use but was significantly and consistently linked to cigarette, alcohol, and marijuana use. The number of dates per week became a non-significant predictor of cigarette, marijuana, and cocaine use during recent historical time periods, but was consistently associated with alcohol use over time. College plans was consistently correlated with cigarette use but not with other outcomes. The most consistency was found among predictors of cigarette use; the least consistency was found among predictors of cocaine use.

Interestingly, the magnitude of some relationships changed across historical time even though we defined the relationships as consistent. As mentioned previously, we tested for interactions between dummy variables representing the seven historical time

periods and predictors in the concatenated sample, and we found that some associations varied significantly in magnitude across historical time periods. For example, the gender difference in cigarette and marijuana use became significantly smaller in recent historical periods. The Black/White difference in cigarette use grew larger over time, whereas the Black/White difference in alcohol use slightly converged. As another example, religious commitment became a significantly weaker predictor of alcohol and marijuana use over time.

There were also cases where predictors were not statistically linked to substance use across any of the seven time periods. For example, the Hispanic/White difference in alcohol use, as well as the relationship between hours worked per week and cocaine use, were non-significant in all seven cohort groupings. Although we considered these relationships inconsistent—because they were statistically insignificant—these relationships could be considered "consistently non-significant."

As reported elsewhere (See Bachman et al., 1980, Bachman et al., 1981; Bachman et al., 1986), consistency in predictors of substance use is related to the level of substance use (See bottom rows of Tables 1 through 4). Comparing the last two periods (1991-93 and 1994-97), substance use increased in the latter period and the proportion of variance explained by risk and protective factors tended to increase concomitantly. Likewise, many predictors were more strongly related to substance use in 1994-97 compared to 1991-93. There were, however, relationships that were contrary to this pattern. For example, number of parents in the household was a strong predictor of cigarette and marijuana use during periods when the level of cigarette and marijuana use, and therefore the variance to explain, was low. Also college plans was a weak predictor of cocaine use during periods when explained variance in cocaine was relatively high.

Phase Two: Variance Explained by Domains of Substance Use Correlates Across Historical Time

In Phase Two of the analysis, we examined whether the five domains of correlates explained a consistent proportion of variance in substance use over successive historical time periods. This is important because an individual correlate may be inconsistently linked to substance use but the domain to which it belongs may maintain predictive power. Figure 1 graphically represents the incremental increase (adjusted for the domains entered before it) in explained variance when the Social Location, Conventionality, Academics, Employment, and Social Interaction domains were entered, respectively, as blocks into hierarchical regression models predicting substance use. Figure 1 should not be read as the independent contribution each domain of predictors makes to explaining variance in substance use because predictors across domains were correlated.

As graphically shown in Figure 1, there was considerable consistency over time in domains that predicted substance use, given the order in which the domains were entered into the regression model. The Academics domain, for example, consistently explained the most incremental variance in all four substance use measures during all historical time periods examined (See Appendix D for exact proportion of variance explained). On the

other hand, the Employment domain consistently explained the least amount of incremental variance in all four substance use measures, given the order in which the blocks of correlates were entered.

The Conventionality domain, controlling for the domain entered before it, explained the second most variance in cigarette use among high school seniors in the 1976-78, 1988-90, and 1994-97 cohorts. However, in other historical time periods, the Social Location domain explained the second largest proportion of variance in cigarette use. The Social Location domain also explained the second largest proportion of variance in alcohol use in every historical time period except 1985-87. The Social Interaction domain explained the second largest amount of variance in alcohol use in 1985-87.

The Conventionality domain consistently explained the second largest proportion of variance in marijuana use across time controlling for the Social Location domain. The Conventionality domain also explained the second largest proportion of variance in cocaine use among high school seniors in the 1976-78, 1988-90, and 1994-97 cohort groupings. During other historical time periods, variables in the Social Location domain accounted for the second largest proportion of variance in cocaine use.

The Social Interaction domain consistently explained the second smallest proportion of variance in cigarette, marijuana, and cocaine use. On the other hand, considering alcohol use, factors in the Social Interaction domain accounted for the third largest proportion of explained variance in six of seven periods (See Appendix D).

DISCUSSION

For the most part, the risk and protective factors investigated were consistently related to substance use among youth across historical time. The predictors explained a greater proportion of variance in high school seniors' past month drinking and past year marijuana use, compared to the variance explained in past month cigarette use and past year cocaine use. Inconsistency tended to be found when the level of substance use declined.

The Academics domain explained the largest proportion of incremental variance in all four outcomes, given the order in which the domains of predictors were entered. In contrast, the Employment domain, comprised of two highly correlated variables (.64), consistently explained the smallest proportion of incremental variance in substance use. The domain that accounted for the second largest proportion of variance varied by outcome and historical time period. For example, in terms of marijuana use, controlling for domains entered before it, the Conventionality domain consistently explained the second largest proportion of variance. In terms of cigarette, alcohol, and cocaine use, the Social Location domain often explained the second largest proportion of variance (See Appendix D).

Strengths, Limitations, and Future Directions

The current study was important because we investigated whether correlates of substance use changed over time—few data sources permit the examination of consistency in correlates over an extended historical time period. Other important strengths of this study were the use of nationally representative data, and the inclusion of a broad range of risk and protective factors and four substance use measures.

There are, however, methodological limitations that should be discussed and research questions beyond the scope of this paper that should be considered. First, our sample may be a biased representation of the entire age cohort because individuals who dropped out of school prior to their senior year or were absent on the day of survey administration were not represented. However the limited degree of change in drop-out rates over the historical periods examined should make this a consistent bias (See Johnston et al., 1998 for a discussion of this issue). Second, the data were cross-sectional; therefore, birth cohort and historical time period effects were confounded. (See Schulenberg, O'Malley, Bachman, & Johnston, 2000, for an example of analyses that examine intra-individual change across historical time.)

A third limitation was in domain coverage and representation of correlates within domains. Brook and Brook (1996), for instance, identified five domains of risk and protective factors consistently linked to substance use among youth: (a) cultural/societal, (b) family, (c) peer, (d) personality/attitudinal, and (e) physiological/genetic. Within each of these domains, they delineate an inclusive range of potential correlates. Our Social Location and Academics domains were constituted of more correlates than other domains and may have been better characterized. An analytic approach that incorporates a broad range of domains and correlates within domains will greatly contribute to our understanding of substance use etiology and prevention.

Fourth, OLS regression makes strong assumptions about the direction of causality, but some correlates may cause substance use and be caused by substance use. For instance, some researchers (Jessor & Jessor, 1977; Jessor et al., 1991) might consider truancy an outcome rather than a predictor of substance use.

Fifth, we investigated the degree to which substance use correlates shifted across historical time period. But developmental time might also interact with risk or protective factors to influence substance use. For instance, exposure to risks over a long period of development may differ substantially from exposure during a shorter developmental period. Brook and Brook (1996, p. 37) wrote "Risk factors influencing the child may vary according to the period of development in which the risks are operative. For example, disruptions in the school setting may have very different implications when these occur during childhood instead of adolescence." Interestingly, Schulenberg et al. (1994) found that grade point average and college plans acted as protective factors during high school. Once youth reached young adulthood, however, the inverse relationship between high school grade point average and current substance use became weaker. In addition, college plans became a risk factor for increased alcohol use.

Sixth, youth substance use might depend upon the interaction of risk and protective factors with the life course of the substance in question rather than historical time. For example, Johnston (1991) suggests that substance use epidemics follow a certain life course: onset, maintenance, and then decline. He hypothesized that particular correlates would have a greater influence on substance use depending upon the substance's life course. Bachman, Johnston, and O'Malley (1998) found support for Johnston's hypothesis when they examined a period of increased marijuana use. They reported that a decrease from 1992 to 1996 in perceived risk and disapproval of marijuana use, a personality/attitudinal protective correlate, was directly linked to an increase in marijuana use among youth during the same period. It may be interesting to group time periods according to the life course of a substance and further examine consistency in factors that predict substance use among youth.

Seventh, inconsistency may be a function of fluctuations in risk and protective factors across historical time period. For example, the level of parental education, college plans, and total weekly income increased over the past twenty-two years (See Appendix B). Changes in the level of risk and protective factors, however, may not influence the relationship between such factors and substance use. For instance, parental education, which increased over time, maintained consistent relationships with both alcohol and marijuana use.

And finally, much of the research on youth substance use investigates micro-level correlates (Brook & Brook, 1996; Johnston, 1991; Petraitis et al., 1995). A notable exception is the work of Wagenaar and Perry (1994) (See also Petraitis et al., 1995). Wagenaar and Perry developed a model of alcohol use that suggests one must consider predictors from multiple levels to understand substance use. In their conceptual model, Wagenaar and Perry (1994) included factors such as public policy, institutional structures, market mechanisms, availability, social integration, social interaction, role modeling, social roles, biological/pharmacological influences, conditioned responses, personality, general beliefs, and substance-specific cognitions as causes of substance use among youth. Further research is needed that integrates both theoretically and empirically substance use correlates from multiple levels.

Studying the Etiology, Prevention, and Correlates of Drug Use Across Historical Time

The degree of predictive consistency of substance use correlates and domains of correlates suggests that prevention and intervention strategies designed to reduce substance use among youth can be effective across historical time. Frequent substance users can be consistently identified using a theoretically established matrix of risk and protection constructed from sound empirical studies. Future studies of consistency will be important because our results suggest non-trivial trends toward changes in the profile of the most likely users of particular substances. For example, controlling for other variables, levels of cigarette use are increasing among recent cohorts of female seniors. It would follow that interventions can be developed, at this historical moment, to further

offset increases in female cigarette use, and theories can be revised to reflect emergent patterns among young women. Finally, our results demonstrate that bonding youth to school and academics can be a reliable and effective strategy for minimizing substance use; interventions should be designed to effect that end.

There remains much to explain regarding correlates of substance use among youth and predictive consistency across historical time periods. The fact that a young person is at high risk does not mean that the young person will use illicit or licit substances. Similarly, the fact that a young person has a number of protective influences operating in his or her life does not mean that the young person will be drug free. Rather, use of illicit and licit substances will depend upon the number and strength of risk and protective factors which operate in their lives, as well as the consistency of associations between risk and protective influences and substance use across time.

In the future, our nation will probably pass through periods of unmatched prosperity and poverty, increased racial and ethnic tension, renewed concern for the environment, incredible technological advancement, and decreased tolerance for criminality. We will likely witness the creation of more powerful illicit substances, a tripling of internet uses and users, and an individualism movement, and be exposed to overwhelming medical evidence about the importance of stress relief, mental health, and a healthy lifestyle. These factors, which are likely to be experienced most intimately by young people, will imprint upon the character of the nation and alter patterns in substance use in ways that may be visible only in hindsight.

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TABLES

Table 1
Unstandardized Coefficients from OLS Regression of Past Month Cigarette Use on Risk and Protective Factors among High School Seniors

	1976-1997 r_{xy}	76-97	76-78	79-81	82-84	85-87	88-90	91-93	94-97
SOCIAL LOCATION									
1. Gender (0=male)	.008*	.181*	.252*	.260*	.268*	.201*	.118*	.094*	.090*
2. Black (0=else)	-.113*	-.421*	-.155*	-.302*	-.417*	-.378*	-.486*	-.593*	-.628*
3. Hispanic (0=else)	-.057*	-.246*	-.146	-.248*	-.180*	-.266*	-.243*	-.259*	-.300*
White (excluded)	.131*								
4. Parental education	-.058*	.006	.017	-.012	-.016	-.004	.029*	.017	.026*
5. No. of parents/household	-.053*	-.091*	-.090*	-.102*	-.067*	-.122*	-.117*	-.092*	-.086*
6. Urbanicity	-.008*	-.010*	-.032*	.028*	.011	-.010	-.027*	-.003	-.028*
7. Northeast (0=else)	.051*	-.017	.036	-.082*	-.009	.131*	-.090*	-.057	-.046
8. North Central (0=else)	.043*	-.029*	-.080*	-.055	-.008	.034	-.016	-.042	-.032
9. West (0=else)	-.076*	-.322*	-.335*	-.405*	-.350*	-.188*	-.291*	-.287*	-.321*
South (excluded)	-.026*								
CONVENTIONALITY									
10. Religious commitment	-.183*	-.128*	-.193*	-.105*	-.132*	-.103*	-.131*	-.117*	-.120*
11. Political beliefs	.110*	.072*	.085*	.066*	.058*	.062*	.068*	.070*	.086*
ACADEMICS									
12. College plans	-.209*	-.130*	-.114*	-.136*	-.117*	-.151*	-.118*	-.116*	-.118*
13. GPA	-.208*	-.084*	-.110*	-.084*	-.093*	-.062*	-.083*	-.088*	-.092*
14. Truancy	.228*	.187*	.201*	.158*	.168*	.202*	.161*	.177*	.200*
EMPLOYMENT									
15. Hours worked/week	.133*	.030*	.043*	.033*	.027*	.018*	.019*	.031*	.025*
16. Total income/week	.112*	.014*	.022*	.019*	.014	.018*	.020*	.014*	.034*
SOCIAL INTERACTION									
17. No. of evenings out	.214*	.126*	.145*	.137*	.112*	.104*	.102*	.100*	.145*
18. No. of dates/week	.139*	.022*	.052*	.031*	.030*	.029*	.016*	.000	.005
Intercept		1.896	1.991	1.715	1.915	1.772	2.031	2.005	1.859
Adjusted R^2		16.87%	19.57%	16.31%	16.07%	16.53%	15.35%	16.36%	19.97%
N		188,682							
Past Month Cigarette mean		1.739	1.955	1.761	1.709	1.671	1.656	1.638	1.770
standard deviation		1.297	1.452	1.335	1.297	1.236	1.222	1.198	1.289

* $p < .001$

Table 2
Unstandardized Coefficients from OLS Regression of Past Month Alcohol Use on Risk and Protective Factors among High School Seniors

	1976-1997 r_{xy}	76-97	76-78	79-81	82-84	85-87	88-90	91-93	94-97
SOCIAL LOCATION									
1. Gender (0=male)	-.155*	-.258*	-.273*	-.275*	-.234*	-.193*	-.226*	-.212*	-.207*
2. Black (0=else)	-.163*	-.592*	-.544*	-.750*	-.691*	-.641*	-.540*	-.501*	-.425*
3. Hispanic (0=else)	-.050*	-.190*	-.116	-.156	-.133	-.086	-.107	.027	.045
White (excluded)	.168*								
4. Parental education	.026*	.048*	.087*	.069*	.066*	.058*	.066*	.072*	.087*
5. No. of parents/household	.010*	.007	-.002	-.003	.020	-.030	-.022	-.062*	-.023
6. Urbanicity	.010*	-.012*	-.033*	.010	-.041*	-.031*	-.042*	-.014	-.053*
7. Northeast (0=else)	.063*	.093*	.138*	.187*	.156*	.025	-.046	-.123*	-.036
8. North Central (0=else)	.053*	.073*	.142*	.050	.174*	.046	.048	.033	-.052
9. West (0=else)	-.046*	-.306*	-.313*	-.408*	-.343*	-.235*	-.307*	-.330*	-.355*
South (excluded)	-.069*								
CONVENTIONALITY									
10. Religious commitment	-.196*	-.153*	-.238*	-.191*	-.200*	-.189*	-.174*	-.173*	-.133*
11. Political beliefs	.108*	.071*	.097*	.086*	.072*	.074*	.059*	.044*	.045*
ACADEMICS									
12. College plans	-.103*	-.045*	.007	-.023	.007	.013	-.003	-.015	-.023
13. GPA	-.166*	-.070*	-.071*	-.071*	-.078*	-.063*	-.071*	-.073*	-.064*
14. Truancy	.317*	.360*	.330*	.341*	.338*	.374*	.350*	.339*	.360*
EMPLOYMENT									
15. Hours worked/week	.133*	.047*	.032*	.034*	.029*	.013	.007	.011	-.002
16. Total income/week	.119*	-.008*	.045*	.034*	.044*	.038*	.042*	.023*	.043*
SOCIAL INTERACTION									
17. No. of evenings out	.320*	.253*	.286*	.278*	.284*	.256*	.234*	.204*	.212*
18. No. of dates/week	.166*	.041*	.054*	.052*	.041*	.045*	.030*	.027*	.020*
Intercept		1.567	1.402	1.475	1.493	1.409	1.488	1.542	1.302
Adjusted R^2		23.00%	29.33%	26.90%	25.55%	22.31%	21.24%	19.80%	20.49%
N		179,920							
Past Month Drinking mean		2.486	2.733	2.784	2.653	2.553	2.369	2.138	2.153
standard deviation		1.555	1.594	1.616	1.565	1.552	1.502	1.432	1.469

* $p < .001$

Table 3

Unstandardized Coefficients from OLS Regression of Annual Marijuana Use on Risk and Protective Factors among High School Seniors

	1976-1997 r_{xy}	76-97	76-78	79-81	82-84	85-87	88-90	91-93	94-97
SOCIAL LOCATION									
1. Gender (0=male)	-.106*	-.015*	-.170*	-.173*	-.143*	-.085*	-.073*	-.055**	-.140*
2. Black (0=else)	-.076*	-.281*	-.181*	-.292*	-.205*	-.281*	-.383*	-.393*	-.260*
3. Hispanic (0=else)	-.040*	-.330*	-.169	-.157	-.120	-.108	-.193*	-.074	-.235*
White (excluded)	.089*								
4. Parental education	.008*	.046*	.115*	.086*	.049*	.054*	.085*	.065*	.073*
5. No. of parents/household	-.044*	-.102*	-.123*	-.172*	-.122*	-.186*	-.113*	-.125*	-.145*
6. Urbanicity	.076*	.079*	.062*	.102*	.103*	.045*	.021	.039*	.028
7. Northeast (0=else)	.080*	.184*	.224*	.201*	.216*	.193*	-.045	.037	.065
8. North Central (0=else)	.006	.032	-.009	.142*	.081	.029	-.051	-.003	-.046
9. West (0=else)	.013*	-.093*	-.105	-.099	-.010	-.043	-.163*	.019	-.185*
South (excluded)	-.085*								
CONVENTIONALITY									
10. Religious commitment	-.230*	-.261*	-.470*	-.377*	-.329*	-.278*	-.230*	-.179*	-.244*
11. Political beliefs	.168*	.187*	.245*	.226*	.166*	.141*	.134*	.136*	.213*
ACADEMICS									
12. College plans	-.124*	-.103*	-.006	-.069*	-.063*	-.046*	-.052*	-.039*	-.030
13. GPA	-.192*	-.097*	-.139*	-.109*	-.116*	-.097*	-.101*	-.084*	-.106*
14. Truancy	.341*	.509*	.556*	.564*	.519*	.475*	.391*	.335*	.467*
EMPLOYMENT									
15. Hours worked/week	.100*	.057*	.027*	.034*	.026*	.014	-.002	-.009	-.004
16. Total income/week	.084*	-.036*	.053*	.035*	.018	.025*	.028*	.030*	.048*
SOCIAL INTERACTION									
17. No. of evenings out	.281*	.283*	.366*	.365*	.304*	.261*	.175*	.169*	.269*
18. No. of dates/week	.126*	.023*	.066*	.038*	.029*	.029*	.015	-.009	-.005
Intercept		1.182	1.050	.991	1.180	1.240	1.311	1.042	.906
Adjusted R^2		22.44%	30.32%	27.17%	23.73%	20.86%	18.01%	16.73%	23.11%
N		187,740							
Annual Marijuana mean		2.274	2.808	2.774	2.389	2.196	1.872	1.698	2.157
standard deviation		2.017	2.324	2.283	2.047	1.908	1.671	1.529	1.945

* $p < .001$

Table 4
Unstandardized Coefficients from OLS Regression of Annual Cocaine Use on Risk and Protective Factors among High School Seniors

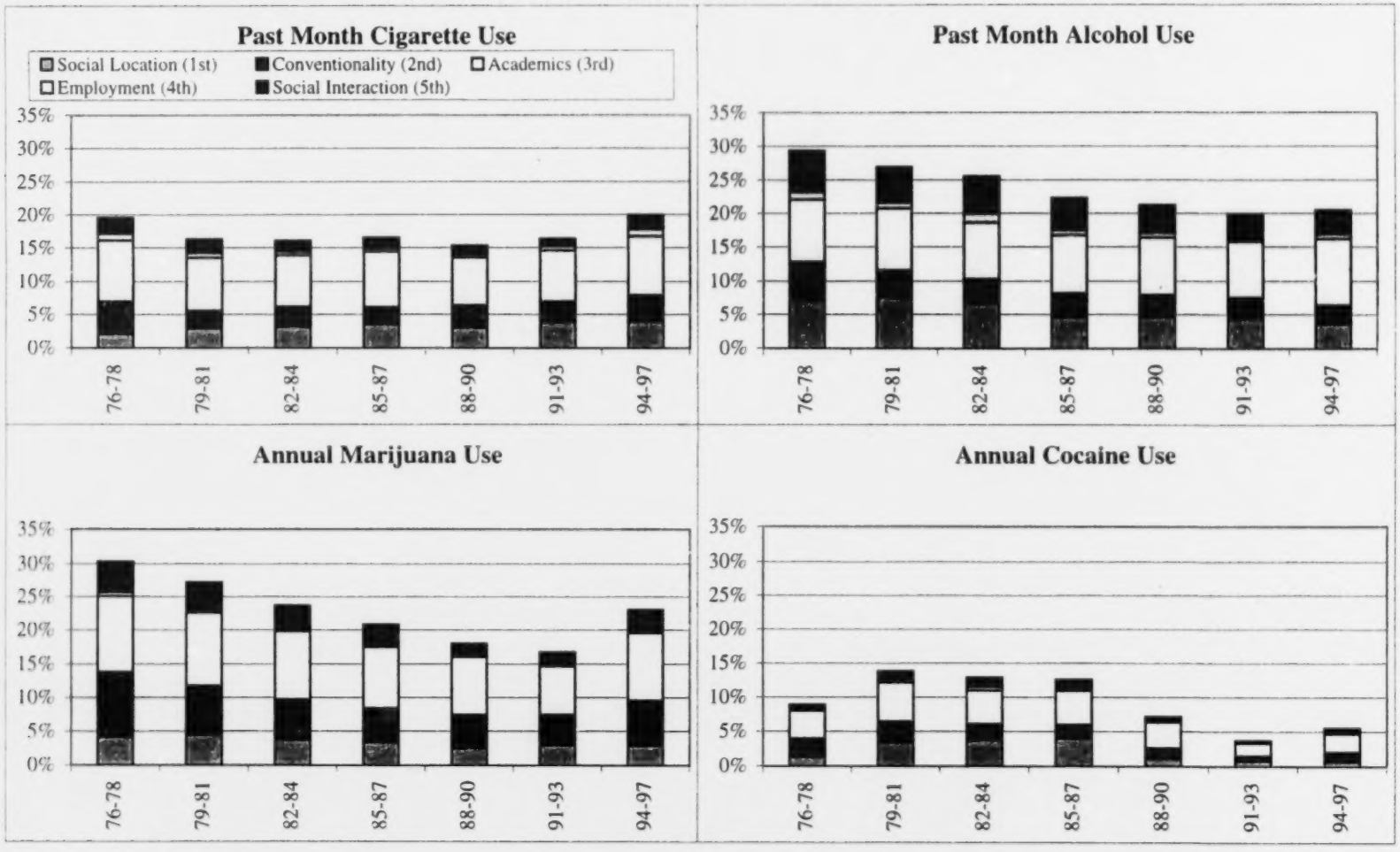
	1976-1997 r_{xy}	76-97	76-78	79-81	82-84	85-87	88-90	91-93	94-97
SOCIAL LOCATION									
1. Gender (0=male)	-.050*	-.013*	-.023	-.005	-.002	-.009	-.001	-.009	-.002
2. Black (0=else)	-.055*	-.085*	-.028	-.104*	-.111*	-.128*	-.074*	-.062*	-.085*
3. Hispanic (0=else)	.008*	-.021	.025	-.024	-.006	.012	.024	.034	.014
White (excluded)	.041*								
4. Parental education	.010*	.012*	.024*	.037*	.021*	.005	.017*	-.003	-.003
5. No. of parents/household	-.044*	-.048*	-.034*	-.057*	-.069*	-.094*	-.045*	-.029*	-.033*
6. Urbanicity	.058*	.019*	.011	.015	.026*	.038*	.011	.006	-.004
7. Northeast (0=else)	.048*	.049*	-.010	.025	.137*	.187*	-.025	-.040*	-.019
8. North Central (0=else)	-.041*	-.025*	-.035*	-.001	-.017	-.031	-.052*	-.028*	-.016
9. West (0=else)	.069*	.097*	.013	.217*	.193*	.196*	.015	-.014	-.028
South (excluded)	-.056*								
CONVENTIONALITY									
10. Religious commitment	-.128*	-.046*	-.053*	-.090*	-.075*	-.068*	-.051*	-.017*	-.017*
11. Political beliefs	.097*	.037*	.042*	.055*	.044*	.052*	.026*	.016*	.035*
ACADEMICS									
12. College plans	-.065*	-.024*	-.002	-.009	-.008	-.033*	-.027*	-.007	-.026*
13. GPA	-.104*	-.017*	-.014*	-.024*	-.021*	-.019*	-.019*	-.009*	-.009*
14. Truancy	.221*	.124*	.101*	.171*	.164*	.187*	.113*	.059*	.074*
EMPLOYMENT									
15. Hours worked/week	.064*	.005*	.002	.000	.000	-.005	-.003	.002	-.001
16. Total income/week	.077*	.006*	.008	.012*	.023*	.027*	.015*	.000	.005
SOCIAL INTERACTION									
17. No. of evenings out	.150*	.049*	.039*	.079*	.070*	.070*	.039*	.022*	.038*
18. No. of dates/week	.086*	.012*	.008*	.018*	.015*	.023*	.007	.001	-.001
Intercept		.865	.827	.717	.691	.705	.979	1.018	1.006
Adjusted R^2		8.66%	8.95%	13.87%	12.93%	12.65%	7.15%	3.71%	5.49%
N		189,330							
Annual Cocaine mean		1.176	1.136	1.255	1.241	1.280	1.154	1.073	1.101
standard deviation		.732	.596	.855	.831	.937	.712	.492	.573

* $p < .001$

FIGURES

Figure 1

Explained Incremental Variance in Substance Use Associated with Domains of Correlates



APPENDIXES

APPENDIX A: DESCRIPTION OF MEASURES

Illicit and Licit Substance Use

1. Past month cigarettes: "How frequently have you smoked cigarettes during the past 30 days?" 1 = not at all, 2 = less than one cigarette per day, 3 = one to five cigarettes per day, 4 = about one-half pack per day, 5 = about one pack per day, 6 = about one and one-half packs per day, 7 = two packs or more per day.

2. Past month drinking: "On how many occasions (if any) have you had alcohol to drink—more than a few sips...during the last 30 days?" 1 = 0 occasions, 2 = 1-2 occasions, 3 = 3-5 occasions, 4 = 6-9 occasions, 5 = 10-19 occasions, 6 = 20-39 occasions, 7 = 40 or more.

3 Past year marijuana: "On how many occasions (if any) have you used marijuana...during the last 12 months?" 1 = 0 occasions, 2 = 1-2 occasions, 3 = 3-5 occasions, 4 = 6-9 occasions, 5 = 10-19 occasions, 6 = 20-39 occasions, 7 = 40 or more.

4. Past year cocaine: "On how many occasions (if any) have you used cocaine... during the last 12 months?" 1 = 0 occasions, 2 = 1-2 occasions, 3 = 3-5 occasions, 4 = 6-9 occasions, 5 = 10-19 occasions, 6 = 20-39 occasions, 7 = 40 or more.

Risk and Protective Factors

1. Gender (1 = female; 0 = male).

2. Black (1 = Black; 0 = else).

3. Hispanic (1 = Hispanic; 0 = else).

4. White (1 = White; 0 = else).

5. Parental education: "What is the highest level of schooling your father completed?" "What is the highest level of schooling your mother completed?" 1 = completed grade school, 2 = some high school, 3 = completed high school, 4 = some college, 5 = competed college, 6 = graduate or professional school after college. Arithmetic average of parents' education.

6. No. of parents in household: 0 = none, 1 = 1 parent, 2 = 2 parents.

7. Urbanicity: 1 = farm, 2 = country (not farm), 3 = Non-SMSA, 4 = other SMSA, 5 = Large SMSA.

8. Northeast (1 = Northeast region, 0 = else).

9. North Central (1 = North Central region, 0 = else).

10. West (1 = West region, 0 = else).

11. South (1 = South region, 0 = else).

12. Religiosity: Average of how often student attends religious services and how important religion is in the student's life. 1 = very low, 2 = low, 3 = high, 4 = very high.

13. Political beliefs: "How would you describe your political beliefs?" 1 = very conservative, 2 = conservative, 3 = moderate, 4 = liberal, 5 = very liberal, 6 = radical.

14. College plans: "How likely is it that you will graduate from college (four-year program)?" 1 = definitely won't, 2 = probably won't, 3 = probably will, 4 = definitely will.

15. GPA: "Which of the following best describes your average grade so far in high school?" 1 = D, 2 = C-, 3 = C, 4 = C+, 5 = B-, 6 = B, 7 = B+, 8 = A-, 9 = A.

16. Truancy: Average number of whole days of school skipped in the last four weeks and number of classes skipped in the last four weeks. 1 = none skipped through 6 = ll+ times truant.

17. Hours worked/week: "On average over the school year, how many hours per week do you work in a paid or unpaid job?" 1 = none, 2 = 5 or less hours, 3 = 6 to 10, 4 = 11 to 15, 5 = 16 to 20, 6 = 21 to 25, 7 = 26 to 30, 8 = more than 30 hours.

18. Total income/week: Total weekly sum of income from job(s), allowances, etc. 1 = none, 2 = $1-5, 3 = $6-10, 4 = $11-20, 5 = $21-35, 6 = $36-50, 7 = $51-75, 8 = $76-125, 9 = $126+.

19. No. of evenings out: "During a typical week, on how many evenings do you go out for fun and recreation?" 1 = less than one, 2 = one, 3 = two, 4 = three, 5 = four or five, 6 = six or seven.

20. No. of dates/week: "On the average, how often do you go out with a date (or your spouse, if you are married)?" 1 = never, 2 = once a month or less, 3 = 2 or 3 times a month, 4 = once a week, 5 = 2 or 3 times a week, 6 = over 3 times a week.

Appendix B: Means and Standard Deviations of Risk and Protective Factors by Time Period(s)

	1976-1997				76-78		79-81		82-84		85-87		88-90		91-93		94-97	
	mean	stddev	min	max	mean	stddev	mean	stddev	mean	stddev	mean	stddev	mean	stddev	mean	stddev	mean	stddev
SOCIAL LOCATION																		
1. Gender (0=male)	51.26%	---	0	1	51.31%	---	51.25%	---	50.60%	---	51.79%	---	50.32%	---	51.06%	---	52.31%	---
2. Black (0=else)	12.93%	---	0	1	12.46%	---	12.82%	---	13.50%	---	12.04%	---	12.68%	---	13.93%	---	13.09%	---
3. Hispanic (0=else)	6.43%	---	0	1	3.30%	---	2.92%	---	4.09%	---	5.89%	---	8.09%	---	9.89%	---	10.47%	---
White (excluded)	80.64%	---	0	1	84.24%	---	84.26%	---	82.42%	---	82.07%	---	79.23%	---	76.18%	---	76.45%	---
4. Parental education	3.615	1.184	1	6	3.322	1.173	3.462	1.181	3.486	1.161	3.647	1.174	3.720	1.178	3.753	1.152	3.873	1.171
5. No. of parents/household	1.691	.570	0	2	1.748	.538	1.740	.537	1.700	.561	1.683	.570	1.673	.579	1.646	.598	1.647	.593
6. Urbanicity	3.775	1.042	1	5	3.716	1.113	3.717	1.095	3.757	1.060	3.811	1.004	3.865	.967	3.793	.973	3.773	1.051
7. Northeast (0=else)	21.22%	---	0	1	23.73%	---	23.01%	---	23.18%	---	22.44%	---	19.76%	---	17.41%	---	19.11%	---
8. North Central (0=else)	28.68%	---	0	1	30.26%	---	30.12%	---	29.09%	---	28.22%	---	27.67%	---	27.63%	---	27.77%	---
9. West (0=else)	16.10%	---	0	1	13.72%	---	15.65%	---	15.02%	---	17.30%	---	16.94%	---	17.82%	---	16.40%	---
South (excluded)	34.00%	---	0	1	32.29%	---	31.22%	---	32.71%	---	32.04%	---	35.62%	---	37.15%	---	36.72%	---
CONVENTIONALITY																		
10. Religious commitment	2.764	.919	1	4	2.827	.896	2.884	.893	2.826	.892	2.722	.913	2.685	.919	2.702	.940	2.702	.953
11. Political beliefs	3.154	1.081	1	6	3.212	1.019	3.131	1.051	3.131	1.051	3.152	1.071	3.104	1.080	3.168	1.128	3.175	1.158
ACADEMICS																		
12. College plans	2.876	1.159	1	4	2.511	1.191	2.662	1.185	2.709	1.179	2.874	1.154	3.008	1.126	3.130	1.067	3.204	1.037
13. GPA	5.834	1.939	1	9	5.780	1.888	5.796	1.927	5.685	1.949	5.707	1.927	5.754	1.932	5.885	1.937	6.170	1.963
14. Truancy	1.630	.965	1	6.5	1.698	1.006	1.678	.994	1.573	.918	1.585	.917	1.598	.943	1.595	.938	1.673	1.015
EMPLOYMENT																		
15. Hours worked/week	4.058	2.341	1	8	4.076	2.416	4.229	2.325	3.948	2.328	4.061	2.336	4.157	2.319	3.896	2.304	4.035	2.342
16. Total income/week	5.652	2.243	1	9	4.691	1.933	5.164	1.918	5.455	2.278	5.797	2.240	6.069	2.220	6.020	2.283	6.293	2.323
SOCIAL INTERACTION																		
17. No. of evenings out	3.522	1.324	1	6	3.615	1.347	3.525	1.309	3.462	1.302	3.507	1.300	3.519	1.307	3.493	1.329	3.532	1.359
18. No. of dates/week	3.484	1.609	1	6	3.468	1.606	3.498	1.583	3.491	1.584	3.548	1.590	3.525	1.613	3.499	1.617	3.820	1.655

Appendix C: Bivariate Pairwise Correlations Among Risk and Protective Factors (1976 to 1997)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
SOCIAL LOCATION																				
1. Gender (0=male)	1.00																			
2. Black (0=else)	.04	1.00																		
3. Hispanic (0=else)	-.00*	-.10	1.00																	
4. White (0=else)	-.03	-.78	-.54	1.00																
5. Parental education	-.04	-.10	-.18	.20	1.00															
6. No. of parents/household	-.01	-.22	-.05	.22	.10	1.00														
7. Urbanicity	.02	.06	.10	-.11	.14	-.01	1.00													
8. Northeast (0=else)	.00*	-.05	-.03	.06	.03	.03	.18	1.00												
9. North Central (0=else)	-.00*	-.10	-.12	.16	.00*	.05	-.07	-.33	1.00											
10. West (0=else)	-.01	-.10	.19	-.03	.06	-.00*	.08	-.23	-.28	1.00										
11. South (0=else)	.01	.22	-.00*	-.18	-.07	-.07	-.15	-.37	-.46	-.32	1.00									
CONVENTIONALITY																				
12. Religious commitment	.12	.13	.03	-.13	.01	.07	-.09	-.11	-.02	-.06	.16	1.00								
13. Political beliefs	.02	.02	.02	-.03	.02	-.04	.06	.07	.00*	.01*	-.06	-.18	1.00							
ACADEMICS																				
14. College plans	.03	.01	-.00*	-.01	.37	.08	.16	.03	-.04	.02	-.01	.11	.00*	1.00						
15. GPA	.16	-.12	-.05	.14	.19	.11	-.04	.00	-.01	-.00*	.02	.13	-.04	.36	1.00					
16. Truancy	-.07	-.03	.05	-.01*	-.00*	-.06	.08	.03	-.05	.12	-.07	-.16	.11	-.09	-.21	1.00				
EMPLOYMENT																				
17. Hours worked/week	-.07	-.10	-.03	.10	-.08	-.01	.02	.00	.04	-.00*	-.03	-.08	.01	-.12	-.08	.11	1.00			
18. Total income/week	-.09	-.02	.01	.01	.01	-.05	.10	.00	-.01	-.00*	.01	-.10	.02	-.01	-.07	.13	.64	1.00		
SOCIAL INTERACTION																				
19. No. of evenings out	-.10	-.08	-.06	.11	.03	.02	.03	.05	.03	-.03	-.05	-.09	.07	-.06	-.10	.22	.02	.10	1.00	
20. No. of dates/week	.06	-.08	-.04	.09	-.01	-.00*	-.00*	.02	.01	-.05	.01	-.03	.02	-.06	-.03	.11	.12	.16	.35	1.00

* n. s., p > .001

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Appendix D: Incremental Proportion of Variance Explained by Domain

Past Month Cigarette Use

	76-78	79-81	82-84	85-87	88-90	91-93	94-97
1. Social Location	2.14%	2.95%	3.19%	3.55%	3.05%	3.86%	3.93%
2. Conventionality	4.78%	2.60%	2.97%	2.55%	3.30%	3.06%	3.96%
3. Academics	9.21%	7.98%	7.76%	8.38%	7.20%	7.72%	8.85%
4. Employment	0.99%	0.70%	0.57%	0.52%	0.51%	0.62%	1.07%
5. Social Interaction	2.45%	2.08%	1.58%	1.53%	1.29%	1.10%	2.16%
	19.57%	16.31%	16.07%	16.53%	15.35%	16.36%	19.97%

Past Month Alcohol Use

	76-78	79-81	82-84	85-87	88-90	91-93	94-97
1. Social Location	6.93%	7.44%	6.49%	4.57%	4.63%	4.38%	3.60%
2. Conventionality	5.80%	4.11%	3.87%	3.57%	3.26%	3.11%	2.79%
3. Academics	9.37%	9.25%	8.30%	8.64%	8.54%	8.36%	9.87%
4. Employment	1.09%	0.83%	1.28%	0.76%	0.73%	0.41%	0.67%
5. Social Interaction	6.14%	5.27%	5.61%	4.77%	4.08%	3.54%	3.56%
	29.33%	26.90%	25.55%	22.31%	21.24%	19.80%	20.49%

Annual Marijuana Use

	76-78	79-81	82-84	85-87	88-90	91-93	94-97
1. Social Location	4.13%	4.50%	3.70%	3.36%	2.55%	2.93%	2.84%
2. Conventionality	9.66%	7.20%	6.01%	5.05%	4.86%	4.45%	6.73%
3. Academics	11.31%	10.95%	10.11%	9.09%	8.61%	7.31%	10.02%
4. Employment	0.60%	0.43%	0.31%	0.30%	0.22%	0.24%	0.47%
5. Social Interaction	4.62%	4.09%	3.60%	3.06%	1.77%	1.80%	3.05%
	30.32%	27.17%	23.73%	20.86%	18.01%	16.73%	23.11%

Annual Cocaine Use

	76-78	79-81	82-84	85-87	88-90	91-93	94-97
1. Social Location	1.32%	3.37%	3.75%	4.06%	1.11%	0.82%	0.71%
2. Conventionality	2.64%	3.05%	2.29%	1.92%	1.48%	0.62%	1.28%
3. Academics	4.07%	5.77%	5.02%	5.02%	3.77%	1.91%	2.75%
4. Employment	0.13%	0.14%	0.55%	0.49%	0.23%	0.01%	0.06%
5. Social Interaction	0.79%	1.54%	1.32%	1.16%	0.56%	0.35%	0.69%
	8.95%	13.87%	12.93%	12.65%	7.15%	3.71%	5.49%

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